American Fern Journal 101(3):193–204 (2011)

Ethnopteridology of the Guaranís of Misiones Province, Argentina

HÉCTOR A. KELLER and ESTEBAN I. MEZA TORRES
Instituto de Botánica del Nordeste, UNNE-CONICET, C.C.: 209, 3400 Corrientes, Argentina,
e-mail: hkeller@facfor.unam.edu.ar

GHILLEAN T. PRANCE
School of Biological Sciences, University of Reading, Whiteknights, Reading, RG6 6AS, UK,
e-mail: gtolmiep@aol.com

ABSTRACT.—An ethnobotanical study was performed of the ferns and lycophytes used by the Guaraní of Misiones Province, Argentina. It was determined that fifty species are used, and details of the uses and the Guaraní names and nomenclature are given and discussed. Fern and lycophytes are used for medicines, crafts, in magic rituals, and marketing of the plants. The most important traditional use of ferns is for medicine and the most important modern use is commercialization for use in horticulture.

KEY WORDS.—Guaraní communities, ethnobotany, ferns and lycophytes, Paraná forest

Economic botanists have frequently concentrated on ferns as the focus of their studies, especially their medicinal properties and to a lesser extent their use as foods (Copeland, 1942; Looser and Rodríguez, 2004; Molina *et al.*, 2009, Ortega and Díaz, 1993; Ruiz López, 1805; Turner *et al.*, 1992). Ethnobotanical studies of ferns and lycophytes have been carried out in various part of the world, for example in Bolivia with the ethnopteridological study of the Chácobo (Boom, 1985), the comparative study of ferns and lycophytes used by the Huaorani in Ecuador and the Tacana of Bolivia (Macia, 2004), and in Nigeria in a study of various ethnic groups by Nwosu (2002). Precusors of this type of study in Argentina are limited to the work of Hurrel and de la Sota (1996) who studied the ethnobotany of ferns in a high altitude pasture in the Province of Salta.

The Province of Misiones is the center of diversity of ferns and lycophytes of Argentina (Ponce *et al.*, 2002) where there are 1,123,000 hectares of subtropical, semideciduous Paraná forest and Alto Paraná Atlantic rainforest (Placci and Di Bitteti, 2005). The catalogue of vascular plants of Argentina cited 158 species of monilophytes and lycophytes for the Province of Misiones (Ponce, 1996), but there have been many recent additions (Marquez *et al.*, 2006; Martínez, and de la Sota, 2005; Meza Torres *et al.*, 2006, 2008, 2010, Ponce, 2001; Tressens *et al.*, 2008) bringing the total up to 180 species. This shows the increasing knowledge about the botanical richness of the extreme northeast of the country. The diversity of ferns and lycophytes is also high at the local level. In a reserve of 5340 hectares (about 0.18% of the area of the Province) 80 taxa of these groups were found which represents 43.23% of the total fern flora of the Province (Tressens *et al.*, 2008). This diversity of species

in an area that can be studied in a few days means that they are readily available for use by local peoples who depend on the resources of the flora for their livelihood, especially the indigenous communities that have lived in the area for thousands of years.

Misiones has about one hundred Guaraní communities of the Mbya and Ava Chiripa. Up to present day these groups have maintained much of their traditional life including aspects of cosmology, religion, methods of subsistence, swidden agriculture, ways of hunting and fishing and the gathering of natural products from the forest. However, the fragmentation of their original habitat has obliged them to adopt various new strategies for survival as well as adapting customs of the surrounding global society, such as engaging in temporary employment and the commercialization of various natural products such as ornamental plants and crafts, especially baskets. For the Guaraní, the native vegetation is one of the most important sources of materials for their traditional way of life and also of prime materials for selling to a wider audience. In this paper we analyze the importance of ferns and lycophytes to the indigenous population of Misiones, identifying the species, the Guaraní names, their uses and significance.

Material and Methods

The fieldwork was carried out during an ethnobotanical program that took place between 2000 and 2008 in eleven Guaraní villages in the Departments of Concepción (1), Eldorado (1), Guaraní (4), Lib. Gral. San Martín (1), Montecarlo (1), San Ignacio (1) and San Pedro (2). Eighty four members of the Mbya clan and five members of the Ava Chiripa were interviewed (informants). We interviewed persons of both sexes and of different ages including both old people (more than sixty years of age) and children (less than twelve years of age). During this time we used various ethnographic methods such as participant observations and structured and semi-structured interviews. In some cases herbarium vouchers were collected during walks with informants and in other cases the herbarium material was shown to community members to ask them about names and uses of the plants. This material is deposited in the Instituto Botánica del Nordeste, Corrientes, Argentina (CTES) with duplicates distributed to various other herbaria in Argentina and other countries (ASU, B, BA, CANB, CESJ, ESA, GH, LIL, LP, MEXU, MO, NY, PC, SI). Part of the ethnobotanical work was carried out in a village that is in the Guarani Multiple-use Reserve and is where Tressens *et al.* (2008) carried out an exhaustive floristic inventory and so some of the herbarium vouchers are from that study. The literature studied delimits the ferns and lycophytes families in various ways and here we have followed the nomenclature of de la Sota *et al.* (1998) and Mickel and Smith (2004) both of whom presented their results at the generic and species level without assignment to family.

Results and Discussion

A total of 50 species were indicated as useful by the communities studied (Table 1). These belong to 32 genera and represent 28% of the fern flora of the Province. Regarding the categories of use (Fig. 1), 38 species (76%) were indicated as medicinal, 19 species (38%) are sold commercially as ornamentals or as physical supports for growing ferns and orchids, 15 species (30%) are used in magic, mainly as talismans, 4 species (8%) are ecological indicators, 3 species (6%) are used in crafts (necklaces), and a single species (2%) is used as food. The use of tree ferns to make arrow points is mentioned in the literature but was not found to be in use today.

Folk nomenclature.—The general term for ferns in Guaraní is *amambái* and this includes those species in the class Polypodiopsida. They do not consider tree ferns or those generically known as *chachi* (various ferns with entire fronds) as *amambái*. The Guaraní plant names usually describe a morphological or organoleptic character of the plant. For example, *amambái taka* (bifurcate or branched fern) refers to the fertile fronds that are several times divided of *Doryopteris nobilis*. Because of its sturdy structure *Pteridium arachnoideum* is called *amambái rata* (= hard fern). *Pecluma pectinatiformis* is named *amambái e'e* (= sweet fern) because of the sweet taste of its fronds. Other species of this genus such as *P. sicca* are called *amambái piru* (= dry fern) because their leaves shrivel up in dry periods and then return to normal once humid conditions return. It is interesting to note that the specific epithet of this species "siccum' (= dry) also refers to this same quality. Other names are associated with animals because of some morphological similarity. For example, *mborevi po* (tapir paw) is the name of *Doryopteris nobilis* whose sterile fronds look like the footprint of a tapir (Fig. 2A). Names can sometimes be associated with the habitat of animals, as in *jakare ka'a* (= caiman herb) for *Thelypteris riograndensis*, which, like caimans, lives beside water sources. This name is similarly applied to various ferns by the Tupi-guaraní of Amazonia (Balée, 1994).

Some names refer to other plants, for example species of *Selaginella* are called *koto jaryi* (= false moss) and *Adiatopsis chlorophylla* is called *kurunjy u miri* (small specimen of the tree *kurunjy u*). Some species have bilingual names, as for *Huperzia mandiocana* which is called *pino tyre'i* (epiphytic pine). Other names are derived from the Spanish as is the case for *Adiantum* called *kurantrijo* (derived from culantrillo: *Adiantum capillus-veneris* L., widely distributed in Europe) or from the Quichua language as in *karaguára* (calaguala) that refers to the genera *Asplenium* L. (*A. balansae* and *A. brasiliense*), *Campyloneuron* and *Niphidium*. Finally, various names refer to their use, such as *Pleopeltis pleopeltifolia* being called *memby ja* (giver of children) which is taken by women to increase their fertility.

Medicines.—Medicinal plants are generally used by the Guaraní in the fresh state preferably on the day they are collected. The storing of medicines is confined to plants located far from the village or of short duration. The most frequent method of use is in decoctions of macerated plant material in water at

TABLE 1. List of the ferns and fern allies used by the Guaraní of Misiones, Argentina.

SPECIES	GUARANÍ NAME	USES	PARTS USED	VOUCHERS
Adiantopsis chlorophylla (Sw.) Fée	*kurunjy u miri* (small tree of *Trema micrantha*)	- Necklace beads - Expectorant, treatment of heart problems, stomach refresher	- Fronds	*Keller 2787*
Adiantopsis radiata (L.) Fée	*amambái ũ* (black fern)	- Febrifuge, treatment of nosebleed	- Fronds	*Keller 1057*
Adiantum pseudotinctum Hieron.	*kurantrijo* (from the Spanish "culantrillo", = small cilantro")	- Treatment of headaches and nausea, post partum washing, nosebleed - Necklace beads	- Petioles - Fronds	*Tressens et al. 6469*
Adiantum raddianum C. Presl.	*kurantrijo* (from the Spanish "culantrillo", = "small cilantro"	- Treatment of headache and nausea, febrifuge, nosebleed, diarrhea	- Fronds	*Keller 1371*
Alsophila setosa Kaulf.	*chachĩ rakua* (tree fern with spines)	- Stands for ornamental plants - Formerly used for arrow points - Indicator that soil not suitable for agriculture - Treatment of *Herpes sp.*	- Stems - Sclerenchyma strands - Exudate from petiole	*Tressens et al. 4719*
Anemia phyllitidis (L.) Sw.	*nachĩ'ũ rã* (similar to a mosquito), *typycha ovy* (blue brush)	- Male charm to attract opposite sex - Treatment of sinusitis, expectorant, antidepressant, stomach refresher, treatment of heart infections	- Fertile fronds - Fronds	*Keller 2979*
Anemia simplicior (Christ) Mickel	*jakare ka'a* (caiman plant)	- Male charm to attract opposite sex	- Fronds	*Keller 829*
Anemia tomentosa (Sav.) Sw.	*jakare ka'a* (caiman plant)	- Male charm to attract opposite sex - Muscular tonic, prevention of illness	- Fronds	*Keller & Gatti 1693*
Asplenium balansae (Baker) Sylvestre	*karaguara yvy reegua* (calaguala of the earth)	- Sold as an ornamental - Contraceptive, menstrual analgesic	- Whole plant	*Keller 5629*
Asplenium brasiliense Sw	*karaguara yvy reegua* (calaguala of the earth)	- Sold as an ornamental - Contraceptive, menstrual analgesic	- Whole plant	*Keller 5628*

TABLE 1. Continued.

SPECIES	GUARANÍ NAME	USES	PARTS USED	VOUCHERS
Asplenium scandicinum Kaulf.	*kuña manje'a* (for women)	- Sold as an ornamental - Male charm to attract the opposite sex	- Whole plant - Fronds	*Keller et al. 1939*
Blechnum australe L. subsp. *auriculatum* (Cav.) de la Sota	*amambái* (fern)	- Female contraceptive, treatment of headache	- Whole plant, fronds	*Keller 3599*
Blechnum austrobrasilianum de la Sota	*amambái* (fern)	- Sold as an ornamental	- Whole plant	*Keller 773*
Blechnum brasiliense Desv.	*amambái* (fern)	- Sold as an ornamental	- Whole plant	*Keller 1072*
Campyloneurum lapathifolium (Poir.) Ching	*karaguara ita reegua* (growing on rocks)	- Sold as an ornamental - Menstrual analgesic, treatment of gastritis	- Whole plant - Rhizomes	*Fernández et al. 98*
Campyloneurum nitidum (Kaulf.) C.Presl	*karaguara ita reegua* (growing on rocks), *mburika ka'a* (donkey herb), *jagua ka'a* (dog herb)	- Sold as an ornamental - Treatment of nausea, epilepsy, muscular tonic, blood purifier, female contraceptive, abortive, menstrual analgesic, to facilitate child birth, post-partum washing, treatment of gastritis, asthma, lumbago and kidney infections.	- Whole plant - Rhizomes	*Keller 1081*
Dicksonia sellowiana Hook.	*chachĩ raviju* (woody tree fern), *kereke*	- Stands for ornamental plants - Formerly used for arrow points - Treatment of burns and measles	- Stems - Sclerenchyma strands - Exudate of petiole	*Tressens et al. 4631*
Didymochlaena truncatula (Sw.) J. Sm.	*amambái* (fern)	- Stands for ornamental plants - Sold as an ornamental	- Stems -Whole plant	*Keller 1106.*

TABLE 1. Continued.

SPECIES	GUARANÍ NAME	USES	PARTS USED	VOUCHERS
Doryopteris nobilis (Moore) C.Chr.	*mborevi po* (tapir pawr); *amambái taka* (fern with bifurcate fronds)	- Sold as an ornamental - Necklace beads - Male charm to attract opposite sex - Treatment of colds, headaches, cardiac infections, diarrhea, menstrual analgesic.	- Whole plant - Petioles - Propagules - Fronds	*Keller 1368*
Elaphoglossum pachydermum (Fée) T. Moore	*karaguara ita reegua* (growing on rocks)	- Female contraceptive, abortive, menstrual analgesic	Whole plant	*Keller 7462*
Equisetum giganteum L.	*kavaju ruguái* (horse tail)	- Treatment of head-aches, epilepsy and kidney infections	- Shoots	*Keller 3282*
Hemionitis tomentosa (Lam.) Raddi	*rorarija* (from spanish "doradilla", because the ferruginous indumentum)	- Sold as an ornamental - Used in a procedure to gain power, - Treatment of heart and kidney infections, menstrual analgesic, treatment of female sterility, for healing childs navel, blodd purifier	- Whole plant - Whole plant - Fronds	*Keller & Gatti 1858*
Huperzia mandiocana (Raddi) Trevis.	*pino tyre'i* (epiphytic pine)	- Sold as an ornamental	- Whole plant	*Keller et al. 1941*
Lastreopsis effusa (Sw.) Tindale	*amambái tyre'i* (orphan fern)	- Male charm to attract opposite sex	- Propagules	*Keller 5624*
Lycopodiella cernua (L.) Pic. Serm.	*urukure'a ka'a* (owl herb)	- Male charm to attract opposite sex	- Whole plant	*Keller 1994*
Lycopodium clavatum L.	*urukure'a ka'a* (owl herb)	- Male charm to attract opposite sex	- Whole plant	*Keller 49*
Lygodium volubile Sw	*jakare ka'a* (caiman plant)	- Male charm to attract opposite sex	- Fronds	*Keller & Franco 5814*
Microgramma lindbergii (Kuhn) de la Sota	*ambere ka'a* (small lizard plant)	- Treatment of kidney infections and deafness, menstrual analgesic	- Whole plant	*Keller 5678*

TABLE 1. Continued.

SPECIES	GUARANÍ NAME	USES	PARTS USED	VOUCHERS
Microgramma squamulosa (Kaulf.) de la Sota	*ambere mbói* (small lizard-snake), *anguja ruguái* (rat tail)	- Slimming, menstrual analgesic, female contraceptive, post partum washing, treatment of lumbago.	- Whole plant	*Keller 1080*
Microgramma vacciniifolia (Langsd. & Fisch.) Copel.	*ambere ka'a, ambere mby* (small lizard plant)	- Treatment of kidney infections and deafness, menstrual analgesic	- Whole plant, fronds	*Keller 7541*
Niphidium crassifolium (L.) Lellinger	*karaguara yvyra reegua* (that which grows on trees)	- Sold as an ornamental - Indicator of cardinal points - Muscular toner, menstrual analgesic, treatment to ease child birth, post partum washing	- Whole plant - Rhizomes	*Keller 1889*
Ophioglossum reticulatum L.	*kochĩ apia'i* (peccary penis)	- For colds	- Whole plant	*Keller 3065*
Osmunda regalis L.	*ñachi'ũ rã guachu* (large *Anemia phyllitidis*)	- Treatment of sore throats - Male charm to attract opposite sex	- Whole plant - Fertile fronds	*Keller 1058*
Pecluma filicula (Kaulf.) M. G. Price	*amambái piru* (dry fern)	- Sold as an ornamental - Treatment of female sterility	- Whole plant - Fronds	*Keller 797*
Pecluma pectinatiformis (Lindm.) M. G. Price	*amambái re'ẽ* (sweet fern)	- Chewed as a sweet - Sold as an ornamental - Treatment of epilepsy, blood purifier	- Fronds - Whole plant - Rhizomes	*Keller et al. 3096*
Pecluma sicca (Lindm.) M.G. Price	*amambái piru* (dry fern)	- Sold as an ornamental - Treatment of female sterility	- Whole plant - Fronds	*Tressens 4942*
Pecluma singeri (de la Sota) M.G. Price	*amambái piru* (dry fern)	- Sold as an ornamental - Treatment of female sterility	- Whole plant - Fronds	*Keller 5594*
Phlebodium areolatum (Willd.) J. Sm.	*karaguara* (from quichua "Calaguala")	- Menstrual analgesic	- Rhizomes	*Keller & Paredes 7465*
Pleopeltis pleopeltifolia (Raddi) Alston	*memby ja* (giver of children)	- Menstrual analgesic, treatment of excessive menstruation and female sterility	- Whole plant, fronds	*Keller 776*

TABLE 1. Continued.

SPECIES	GUARANÍ NAME	USES	PARTS USED	VOUCHERS
Pleopeltis squalida (Vell.) de la Sota	*teko'a porã ja* (owner of good customs)	- Indicator of cardinal points - Menstrual analgesic, treatment of excessive menstruation and female sterility	- Whole plant, fronds	*Keller 1891*
Pteridium arachnoideum (Kaulf.) Maxon.	*amambái ratã* (hard fern)	- Menstrual analgesic	- Tender fronds	*Keller & Benitez 2727*
Pteris deflexa Link	*amambái* (fern)	- Indicator of places with an abundance of ticks - Used in a magic process to forget an ex wife	- Fronds	*Tressens et al. 6750*
Pteris denticulata Sw.	*ñachĩ'ũ rã rã* (similar to *Anemia phyllitidis*)	- Treatment of sore throat, antidepressant	- Fronds	*Keller 1892*
Selaginella muscosa Spring	*guaimi ragué* (old lady's hair), *ygau jaryi* (false moss)	- Female contraceptive, washing wounds	- Whole plant	*Tressens et al. 4635*
Selaginella sulcata (Poir.) Mart.	*koto jarýi* (false moss)	- Female contraceptive	- Whole plant	*Keller 1163*
Serpocaulon latipes (Langsd. & Fisch.) A. R. Sm.	*karaguara* (calaguala)	- Menstrual analgesic	- Rhizomes	*Keller & Franco 5827*
Thelypteris recumbens (Rosent.) C. F. Reed	*amambái tyre'i* (orphan fern)	- Male charm to attract opposite sex - Tranquilizer for children	- Propagules	*Tressens et al. 6845*
Thelypteris riograndensis (Lindm.) C. F. Reed	*jakare ka'a* (caiman herb)	- Male charm to attract opposite sex - Antidepressant	- Fronds - Whole plant	*Keller 2975*
Thelypteris scabra (C. Presl)Lellinger	*amambái tyre'i* (orphan fern)	- Male charm to attract opposite sex	- Propagules	*Keller & Gatti 1861*
Vittaria lineata (L.) Sm.	*avukuja guachu* (great owner of long hair)	- Sold as an ornamental - Treatment to make hair grow	- Whole plant - Fronds	*Keller 2409*

room temperature. It is also common to mix the medicinal material in mate water (the infusion of leaves of *Ilex paraguariensis* A. St.-Hil. in the Aquifoliaceae) taken on a daily basis. Many species are used to treat infections of the reproductive system and this use accounts of the most uses reported

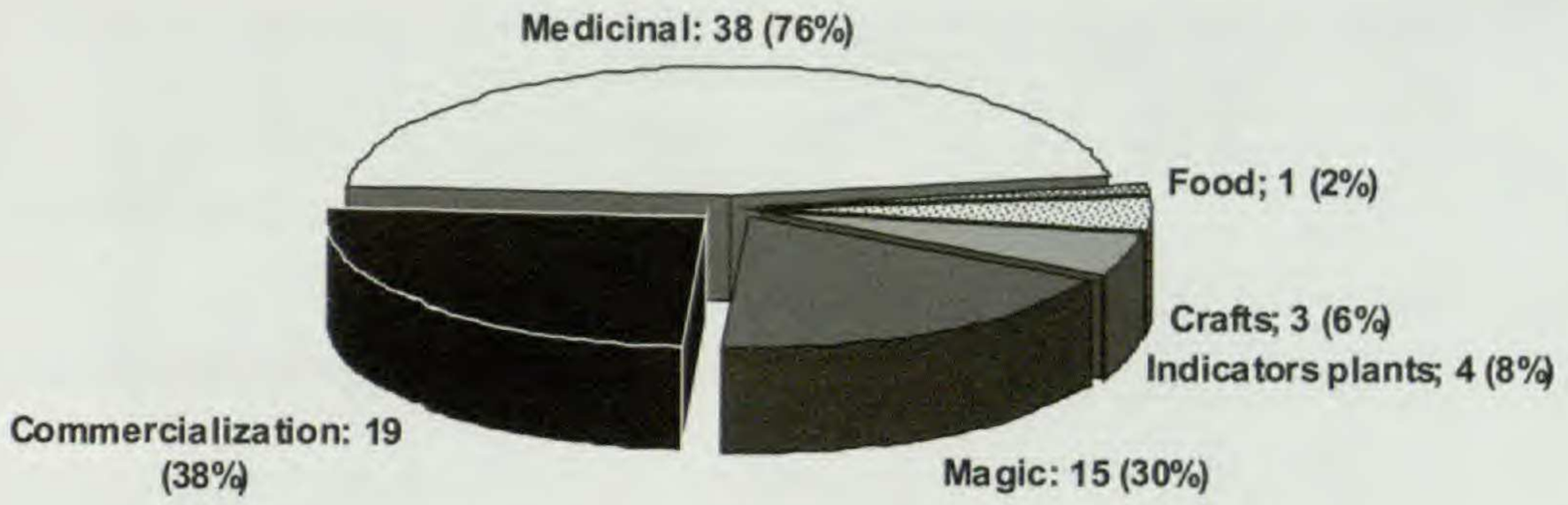

FIG. 1. Species in each category of use.

here (46%). This agrees with the findings of an ethnobotanical study of the Guaraní communities of Pai'i tavytera in Amambay Department of Paraguay (Basualdo and Soria, 2002) where of the three species cited two were used to treat female fertility. Other medicinal use categories that stand out are: treatment of infections of the respiratory (18%), digestive (16%), circulatory (12%) and nervous systems (12%).

Many plants used by the Guaraní of Misiones have their origins from the doctrine of signatures (Keller, 2007). Women who want to have a large family eat ferns of the genera *Pleopeltis* and *Pecluma* that are characterized by their prolific production of small fronds. Tapirs (*Tapirus terrestris*) sleep on their backs with their hooves pressed against their chests and the Guaraní maintain that in this way they cure heart problems. For this reason they attribute heart-healing properties to *Doryopteris nobilis* (*mborevi po* or tapir hooves) whose sterile fronds resemble the tracks of this animal.

Commercialization.—The sale of ornamental plants is the second most important use of ferns and their allies in the communities studied. Ornamental species are sold as single plants or on frames or wooden supports, and others are used to add to groups of epiphytic orchids, which they sell in stands beside the highways (Fig. 2B). One of the most sought after species from the roadside stands is *Huperzia mandioccana*, which is not a common plant. The commercial use of this species could threaten the future of its natural populations. The stems of the tree fern *Dicksonia sellowiana*, a rare species in the region, are cut and sectioned for sale (Fig. 2C). This is a substrate widely used by nurseries as a support for orchids and other epiphytes. The bases of other ferns with a robust stem such as *Alsophylla setosa* are also sometimes used in the same way.

Magic.—Most of the plants used for magic by the Guaraní have names associated with animals and they are usually aromatic plants. They term them *vy'aja* (givers of happiness) or *irû porã* (good friends) to their personal charms. They frequently carry fragments of leaves and other plant materials in pouches in order to have good results form various events especially in their declarations of love. The most used ferns in this category are species of the genus *Anemia* Sw. whose fronds are aromatic and are used in various procedures to attract members of the opposite sex. Sometimes they use these

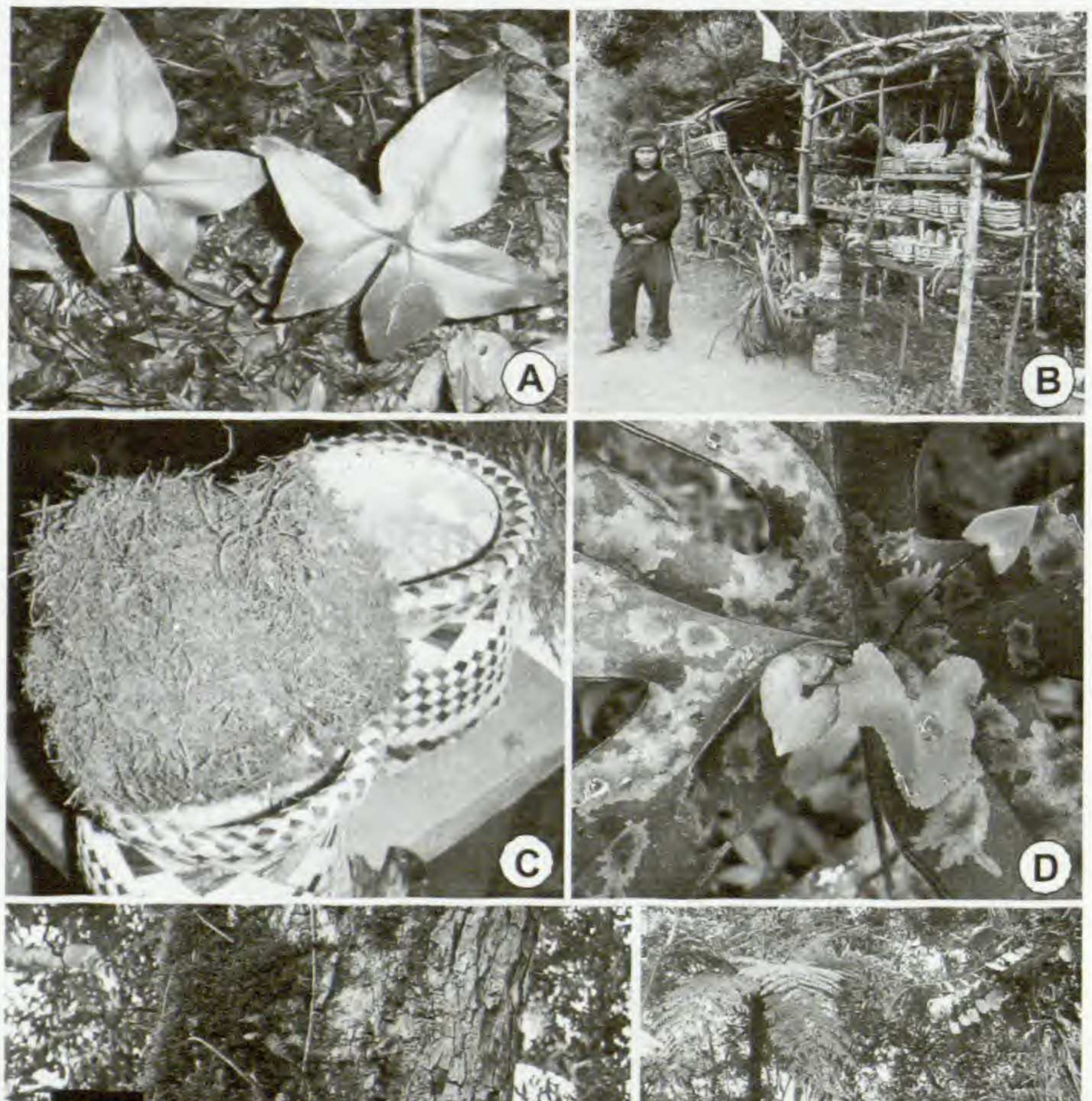

FIG. 2. A: sterile fronds of *Doryopteris nobilis*, similar to tapir footprints. B: Guarani stand for sale of crafts and ornamental plants. C: part of the stem of *Dicksonia sellowiana* for sale. D: propagules of *Doryopteris nobilis*. E: ferns and other epiphytic plants growing on the north facing side of a tree. F: dense population of *Alsophylla setosa*.

plants as a perfume, rubbing the fragrant material on their cheeks. At other times they place fragments of the fern in the bowl of their pipes and blow the smoke in the direction of the person they hope to conquer. The propagules of fern fronds with gemmae are also frequently used as charms (Fig. 2D).

Ecological indicator plants.—Various small ferns grow on tree trunks and often, together with mosses and lichens, form a living carpet along the branches. The Guaraní have noted that some of these small plants are more abundant on the north-facing side of the host tree (Fig. 2E) because this side does not receive as much direct sunlight, and this is particularly so on trees of

large diameter. During their long treks through the forest at night or on cloudy days it is possible to estimate the probable compass points from the location of the carpets of epiphytes on a tree. This is especially true on large, straight-trunked trees.

There are various edaphic characteristics of the deep red soils of Misiones that make them hard to cultivate, such as low fertility, high acidity, high aluminum content, and susceptibility to erosion (Ligier *et al.*, 1990). The Guaraní identify where this type of soil occurs in the forest by the presence of tree ferns (Fig. 2F), specifically *Alsophylla setosa*, and so they avoid establishing their slash and burn agriculture on these sites.

Some large ferns, such as *Pteris deflexa*, form dense clumps on the edge of or in the forest. The Guaraní say that it wise to avoid these areas because of the large number of ticks that occur there. In addition they say that the small deer *Mazama nana* (Cervidae) has the habit of hiding under the fronds of this fern and so they call the deer "amambái guy'i", which translated means "he who is under the fern."

Crafts.—The Guaraní make many crafts from nature such as baskets and carvings either for their own personal use or to sell. They often make bead necklaces to sell to tourists or for themselves for use by either men or women. Amongst the materials used to make beads we have observed the use of the shiny black petioles of *Adiantopsis chlorophylla, Adiantum pseudotinctum* and *Doryopteris nobilis*.

Arrow points.—The construction of arrow points involving the use of the cord-like sclerenchimatous tissue of tree fern petioles by the indigenous people of Misiones was mentioned by Queirel (1897). The mythology of the guayakíes of Paraguay refers to "arrows of ferns" (Fernández, 1992). We have not been able to verify this use from contemporary Guaranis.

Conclusions.—The Guaraní of Misiones use a considerable part of the fern flora of the Province. Ferns and lycophytes provide a variety of resources to maintain their traditional methods of subsistence and their more modern commercial life. The conservation of the biological diversity of Misiones Province undoubtedly has helped to avoid erosion of the cultural diversity of the region as well.

Acknowledgments

Firstly we thank the members of the communities studied for the time and information given. We are grateful to CONICET (Argentina) and the Darwin Initiative (U. K.) for financing our ethnobotanical studies and to M. Dematteis, Ph.D., for a critical reading of the manuscript.

Literature Cited

Balée, W. 1994. *Footprints of the Forest. Ka'apor Ethnobotany, The Historical Ecology of Plant Utilization by an Amazonian People.* Ed. Columbia University Press, New York.

Basualdo, I. and N. Soria. 2002. Etnobotánica de la parcialidad Pa'î Tavyterã. Suplemento Antropológico de la Universidad Católica de Asunción XXXVII(1):173–272.

Boom, B. M. 1985. Ethnopteridology of the Chácobo Indians in Amazonian Bolivia. Amer. Fern J. 75:19–21.

COPELAND, E. B. 1942. Edible ferns. Amer. Fern J. 32:121–126.

DE LA SOTA, E. R., M. M. PONCE, M. A. MORBELLI and L. CASSÁ DE PAZOS. 1998. Pteridophyta in M. N. Correa: (ed.), Fl. Patagónica, Colecc. Ci. Inst. Nac. Tecnol. Agropecu. 8(1):282–369.

FERNÁNDEZ, F. 1992. *Antropología Cultural y medicina indígena de América y arte rupestre argentino. Tomo II.* Ed. Galerna, Buenos Aires. 326 PP.

HURREL, J. A. and E. R. DE LA SOTA. 1996. Etnobotánica de las Pteridofitas de los Pastizales de altura de Santa Victoria (Salta, Argentina). Revista Mus La Plata (NS). Botánica 15(105):353–364.

KELLER, H. A. 2007. Notas sobre medicina y magia entre los guaraníes de Misiones, Argentina, un enfoque etnobotánico. Suplemento Antropológico de la Universidad Católica de Asunción XLII(2):345–384.

LIGIER, H. D., H. R. MATTEIO, H. L. POLO and J. R. ROSSO. 1990. *Atlas de suelos de la República Argentina. Tomo II.* Secretaría de Agricultura, Ganadería y Pesca. Proyecto PNUD Argentina 85/019, Buenos Aires. 676 PP.

LOOSER, G. and R. RODRÍGUEZ. 2004. Los helechos medicinales de Chile y sus nombres vulgares. Gayana Bot. 61(1):1–5.

MACÍA, M. J. 2004. A comparison of useful Pteridophytes between two amerindian groups from Amazonian Bolivia and Ecuador. Amer. Fern J. 94(1):39–46.

MÁRQUEZ, G., G. E. GIUDICE and M. PONCE. 2006. Pteridofitas de la Reserva "Valle del Arroyo Cuñá Pirú"(Misiones, Argentina). Darwiniana 44(1):108–126.

MARTÍNEZ, O. G. and E. R. DE LA SOTA. 2005. Sobre la presencia y distribución de Pteris brasiliensis (Pteridaceae-pteridophyta) en la Argentina. Hickenia 3(56):239–242.

MEZA TORRES, E. I., H. A. KELLER and C. A. BRUSSA. 2010. New Records to Pteridophyte Flora of Northeastern Argentina and Uruguay. Amer. Fern J. 100(3):183–187.

MEZA TORRES, E. I., M. S. FERRUCI, H. A. KELLER and G. MARQUEZ. 2006. Presencia de *Doryopteris lomaricea* (Pteridaceae-Pteridophyta) en Argentina. Bonplandia 15(3–4):143–148.

MEZA TORRES, E. I., G. J. MARQUEZ, E. R. DE LA SOTA and M. S. FERRUCCI. 2008. Nuevas citas en Argyrochosma y Vittaria (Pteridophyta) del NE Argentino. Darwiniana 46(2):360–366.

MICKEL, J. T. and A. R. SMITH. 2004. The pteridophytes of Mexico. Memoirs of the The New York Botanical Garden 88:1–1055.

MOLINA, M., V. REYES-GARCÍA and M. PARDO DE SANTAYANA. 2009. Local Knowledge and Management of the Royal Fern (Osmunda regalis L.) in Northern Spain: Implications for Biodiversity Conservation. Amer. Fern J. 99(1):45–55.

NWOSU, M. O. 2002. Ethnobotanical studies on some Pteridophytes of southern Nigeria. Econ. Bot. 56:255–259.

ORTEGA, F. and W. DIAZ. 1993. Ethnopharmacological notes on two Venezuelan Asplenium. Amer. Fern J. 83:71.

PLACCI, G. and M. di BITETTI. 2006. La situación ambiental en la eco región del bosque atlántico del Alto Paraná (Selva Paranaense). In Brown, A., U. Martinez Ortiz, M. Acerbi and J. Corcuera (eds.) *La situación ambiental Argentina 2005.* Fundacion Vida Silvestre Argentina, Buenos Aires. Pp. 195–210.

PONCE, M. M. 1996. Pteridophyta. In F. O. Zuloaga and O. Morrone, eds. Catálogo de las Plantas Vasculares de la República Argentina I. Monogr. Syst. Bot. Missouri Bot. Gard. 60:1–79.

PONCE, M. M. 2001. Additions and corrections to the pteridophyte flora of Northeastern Argentina. Amer. Fern J. 91(2):70–72.

PONCE, M. M., K. MEHLTRETER and E. R. DE LA SOTA. 2002. Análisis biogeográfico de la diversidad pteridofítica en Argentina y Chile continental Biogeographical analysis of the pteridophyte diversity of continental Argentina and Chile. Rev. Chil. Hist. Nat. 75(4):703–717.

QUEIREL, J. 1897. Misiones. Taller tipográfico de la Penitenciaría Nacional, Buenos Aires. p. 163.

RUIZ LÓPEZ, H. 1805. Memoria sobre la legitima Calaguala y otras dos raices que con el mismo nombre nos vienen de la America meridional. imprenta de D. José del Collado, Madrid. 60 p.

TRESSENS, S. G., H. A. KELLER and V. REVILLA. 2008. Las plantas vasculares de la Reserva de Uso Multiple Guaraní, Misiones. Bol. Soc. argent. Bot. 43(3–4):273–293.

TURNER, N. J., L. M. JOHNSON GOTTESFELD, H. V. KUHNLEIN and A. CESKA. 1992. Edible wood fern rootstocks of Western North América: solving an ethnobotanical puzzle. J. Ethnobiol. 12(1):1–34.